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(71) Applicant(s)

**Scapa Group Plc**  
(Incorporated in the United Kingdom)  
Oakfield House, 93 Preston New Road, BLACKBURN,  
Lancashire, BB2 6AY, United Kingdom

(72) Inventor(s)

**Ian Christison Sayers**

(74) Agent and/or Address for Service

**Wilson Gunn McCaw**  
41-51 Royal Exchange, Cross Street, MANCHESTER,  
M2 7BD, United Kingdom

(51) INT CL<sup>6</sup>

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N424 N426 N427 N489 N494 N53Y N530 N577 N58X  
N58Y N593 N70X N71Y N711 N769 N779  
U1S S1659

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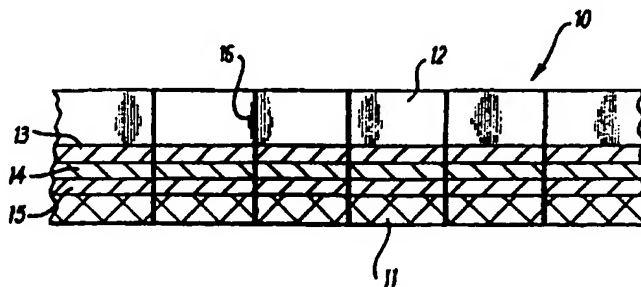
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(54) Abstract Title

**Papermaking press felt with elastomer fibre layer**

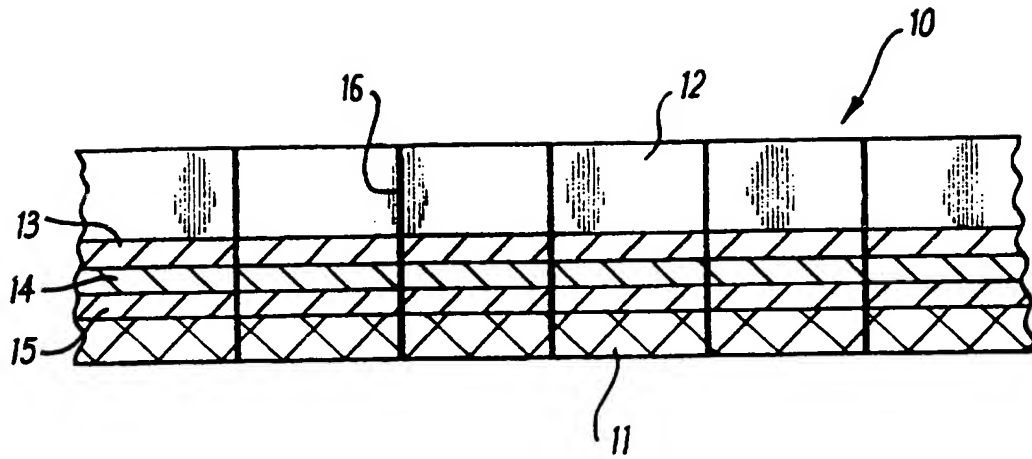
(57) A papermaking press felt (10) comprises at least one resilient nonwoven elastomer fibre layer (13,14). There may be between four and eight such layers. The elastomer fibres (13,14) may be produced by a melt blowing process and may be produced as one or more spunbond layers. At least one nonwoven layer may contain bicomponent fibres. The felt (10) may comprise a base structure (11) and a paper contacting surface which may be a nonwoven fibre batt (12), and the elastomer layer may be between these layers. The elastomeric material may be a polyether amide block co-polymer or may be a thermoplastic polyurethane. The fibrous layers may be treated with a silicone or fluoropolymeric material to enhance their hydrophobic properties. The elastomeric fibres may be very fine to produce a capillary dewatering action. The layers may contain fibres of different materials, fineness, dimension or chemical composition. The elastomeric layers (13,14) may be from 0.05 to 2.0 mm in thickness with a base weight from 10 to 80 g/m<sup>2</sup>. The felt (10) may be assembled by needling the layers together.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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PAPERMAKING PRESS FELTS

This invention relates to improvements in papermaking press felts.

Press felts usually combine a base fabric which provides support and reinforcement for a fibrous batt layer, usually of nonwoven material, which contacts the paper. The press felt is provided for the purpose of dewatering the paper sheet and the felt structure as a whole must be permeable in order to remove water from the paper.

Base cloths of the conventional woven type are expensive in manufacture and, furthermore, can give rise to the occurrence of marking of the paper as it passes through the press section of the papermaking machine due to the presence of knuckles formed at the cross-over points of the warp and weft yarns which form the base cloth. In order to overcome these problems press felts have been developed which contain as a base structure a combination of a woven basecloth and a synthetic thermoplastic nonwoven membrane as described in US 4740409. These press felts are described in GB 2254288. Although these felts have shown a considerable improvement in terms of reduced marking tendency thanks to their high resistance to compaction, it has been found that finer grades of paper in particular can be susceptible to marking by the characteristic grid-like structure of the membrane layer.

The lands of the base structure produce 'dead' area

onto which water impinges and then deflects sideways into the apertures between the lands.

An object of this invention is to provide a press felt having the resilience and resistance to compaction of the above fabrics, while substantially eliminating such marking, particularly in finer grades of paper.

According to the invention, a papermaking press felt comprises at least one resilient nonwoven elastomer fibre layer.

Preferably, one or more, for example between four and eight, layers of elastomeric fibre nonwovens may be incorporated into the structure of the felt. The elastomeric fibres may be produced as a layer, by a meltblowing process, such as described in WO 92/16366. Alternatively, the elastomeric fibres may be produced as a spunbond layer. Preferably the material used for elastomeric fibres is a polyether amide block co-polymer. A suitable polyether amide block co-polymer is manufactured under the tradename PEBAX by Elf, Atochem.

Spunbond layers are produced from relatively coarse filaments of molten polymer, which are continuously extruded onto a roll or belt and then mechanically consolidated, for example using a heated roll. The meltblowing process however, produces a fibre layer from fine filaments of molten polymer with a finite length, blown onto a roll or belt.

Preferably, the layer or layers of elastomer nonwoven

fibres are placed between the paper-contacting surface of the press felt, and the upper surface of the base structure. The base structure can be a woven cloth, knitted fabric, composite membrane, or other nonwoven structure. The paper contacting surface may be a nonwoven fibre batt, of the well known kind.

The elastomeric material used in production of the fibres of the nonwoven layer or layers may for example be thermoplastic polyurethane, or any other thermoplastic elastomer. The, or some of the, nonwoven layers may contain one or more fibres of different material composition, or of different fineness and different layers and the assembly of nonwoven fabric may be of different chemical composition or fibre dimensions. At least one of the nonwoven layers may contain bicomponent fibres.

The fibres may be in the range of 0.5-80 microns in diameter. The nonwoven layer is ideally 0.05 to 2.0 mm, and preferably 0.08 to 1.2 mm in thickness, and it ideally has a basis weight of 10 to 80 g/m<sup>2</sup>. The permeability of the nonwoven layer is typically 200 to 400 cfm.

The fibrous layers may be chemically treated, and individual layers may be differently chemically treated. A preferred treatment is with a silicone or a fluoropolymeric material to improve the hydrophobic qualities of the fibres, and thereby reduce web rewetting.

The papermaking press felt may be assembled by needling the batt staple fibre, forming the paper

contacting surface; the layer or layers of nonwoven elastomer fibres, and the base layer or structure together.

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawing, which is a cross-sectional view of one embodiment of papermaking press-felt according to the invention.

In the drawing, a press felt 10 is made up from a base structure 11, which provides mechanical strength and support for the press felt 10, and an upper, paper contacting surface layer, provided by a nonwoven fibrous batt layer 12. The base 11 is shown as woven, but may be a mesh or perforated membrane, alone or in combination with a woven structure.

In accordance with the invention, a plurality of layers, in this case three, 13, 14 and 15 are provided between the base 11 and the batt layer 12. The layers 13, 14 and 15 are each a nonwoven fabric of elastomeric fibres. The elastomeric fibres in a preferred embodiment, are made from a polyether amide block co-polymer, such as that made by Elf Atochem under the Trade Mark PEBAX. The nonwoven fabrics are formed by depositing fibres onto a forming belt or roll by means of a meltblowing process. The fibres are of thermoplastic urethane, and in at least one of the layers 13, 14 or 15 have been treated with a fluoropolymer to enhance their hydrophobic properties and thereby reduce web rewetting. An alternative such treatment is with a silicone material. The fibres have diameters of e.g. from

0.5-80 microns in diameter. They provide a high capillary action as they are finer than the paper fibres, and therefore these are capillary fibres urging water to pass from the paper web into the body of the felt, thus increasing dewatering, and at the same time these capillary fibres act as a barrier to water flowing back towards the paper web and rewetting it.

In addition to the dewatering properties of the elastomeric webs, they also provide improved mechanical properties by providing a resilient cushioning between the base structure 11, and the paper contacting surface of batt layer 12, reducing the tendency of the felt to mark the paper. The reduced marking tendency is enhanced by the fact that there is less 'dead area'. The nonwovens in this embodiment have a much more uniform distribution of open area and dead area, so this deflection of water expelled from the paper web onto the felt does not occur.

It is possible for the layers 13,14,15 to be made of fibres of different elastomeric materials, or to be intermeshed with layers of other materials for differing purposes. The, or some of the elastomeric nonwovens may be of spunbond fabrics, which tend to be relatively coarse, and potentially of indefinite length. Further the number, of the elastomeric nonwoven layers may be as few as one, or as many as eight or more, and the thickness of the layers may be varied widely. Bicomponent fibres may be used in the nonwoven layer of layers, e.g. fibres comprising a

sheath of a first material and a core of a second material. or comprising twisted or braided strands of fibres of different materials. The materials of the bicomponent yarns may differ in important physical properties, such as melting point or elasticity.

As shown diagrammatically, the composite structure of the press felt 10 is secured together by needled fibres 16 which pass through the batt layer 11, the elastomeric nonwoven layers 13,14 and 15 and the base 11.



**CLAIMS**

1. A papermaking press felt comprising at least one resilient nonwoven elastomer fibre layer.
2. A papermaking press felt according to claim 1, wherein between four and eight (inclusive) layers of elastomeric fibre nonwoven material are incorporated into the structure of the felt.
3. A papermaking press felt according to claim 1 or claim 2 wherein the elastomeric fibre comprises a polyether amide block co-polymer.
4. A papermaking press felt according to claim 1, 2 or 3, wherein the elastomeric fibres are produced as a layer by a melt blowing process.
5. A papermaking press felt according to claim 1, 2 or 3, wherein the elastomeric fibres are produced as one or more spunbond layers.
6. A papermaking press felt according to any preceding claim wherein at least one nonwoven layer contain bicomponent fibres.
7. A papermaking press felt according to any preceding claim, wherein the layer or layers of elastomer nonwoven fibres are placed between the paper contacting surface of the press felt and the upper surface of a base structure.
8. A papermaking press felt according to claim 7, wherein the base structure is selected from the group comprising:-a woven cloth, knitted fabric, a composite membrane or a nonwoven structure.

9. A papermaking press felt according to claim 7 or claim 8, wherein the paper contacting surface is provided by a nonwoven fibre batt.
10. A papermaking press felt according to any preceding claim wherein the elastomeric material is a thermoplastic polyurethane.
11. A papermaking press felt according to any preceding claim, wherein the , all of the or some of the nonwoven layers contain one or more fibres of a different material.
12. A papermaking press felt according to any preceding claim, wherein different layers of the layers of nonwoven fabric are of different chemical composition.
13. A papermaking fabric press felt according to any one of claims 1 to 10, wherein the or some of the nonwoven layers contain fibres of different fineness.
14. A papermaking press felt according to any one of claims 1 to 10, wherein different layers of the nonwoven fabric are of different fibre dimension.
15. A papermaking press felt according to any preceding claim, wherein the fibres are in the range of 0.5-80 microns in diameter.
16. A papermaking press felt according to any preceding claim, wherein the elastomeric nonwoven layer is from 0.05 to 2.0 mm in thickness, with a basis weight of from 10 to 80 g/m<sup>2</sup>.
17. A papermaking press felt according to claim 16, wherein the elastomeric nonwoven layer is from 0.08 to

1.2mm in thickness.

18. A papermaking press felt according to any preceding claim, wherein the fibrous layer or layers are chemically treated.

19. A papermaking press felt according to claim 18, wherein the or least one of the fibrous layers has been treated with a silicone or a fluoropolymeric material.

20. A Papermaking press felt according to any preceding claim, wherein the press felt is assembled by needling the batt staple fibre forming the paper contacting surface, the layer or layers of nonwoven elastomer fibres and the base layer or structure together.

21. A papermaking press felt substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.



Application No: GB 9727529.1  
Claims searched: 1-21

Examiner: Ben Micklewright  
Date of search: 2 February 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.Q): D1R (RAA RBE) D2A (ABF AJA)  
Int Cl (Ed.6): D21F (7/08)  
Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X,Y	GB 2 036 114 A (NORDISKAFILT) See e.g. page 1 lines 65-72	X,Y: 1-14,20
X,Y	EP 0 446 355 A1 (NIPPON) See e.g. page 1 line 23, 38-48, page 2 line 26-28 and the figures	X,Y: 1-14,20
X	DE 23 61 711 A1 (DLW) See e.g. the abstract and the figure	1-14,20
X	JP 040057987 (ICHIKAWA) See e.g. the abstract and the figures	1-14,20
Y	US 4 851 281 (HUYCK) See e.g. column 3 lines 51-63 and the figures	1-14,20
X	US 4 323 622 (ALBANY) See e.g. column 2 line 57 to column 3 line 66	1-14,20
X	WPI Abstract Accession No. 91-278452/38 & JP 030185193 (ICHIKAWA) 13.08.91 (see abstract)	1-14,20

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.